



## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

John West and Deng-ke-Yang

Group Art Unit: 2515

Serial No. 08/057,662

Examiner: Miller

Filed: May 4, 1993

For: MULTISTABLE CHIRAL NEMATIC DISPLAYS

Docket: 12-199C2

**DECLARATION UNDER 37 C.F.R. § 1.132**

I, J. William Doane, declare:

1. I am the Director of the Liquid Crystal Institute (LCI) at Kent State University and am familiar with the subject matter of U.S. Patent Application Serial No. 08/057,662 filed May 4, 1993.

2. As Director of the LCI I closely follow the state of the art on both the research and the industry levels. I attend and lecture at numerous symposia annually, and frequently meet with and host representatives from the industrial and commercial sectors. As a result, I have extensive knowledge of types and nature of the liquid crystal cells and displays currently available, as well as the needs of the industry for displays having particular characteristics which overcome the drawbacks of existing technology.

3. Through my frequent contact with those in the commercial sector, the need has been expressed by those in the flat panel display market for a reflective display that will display information with print-on-paper like quality, i.e., that can be viewed in either bright sunlight or in normal or low-level room light conditions without the need of an auxiliary light source such as the backlights now present in liquid crystal displays. It has also been expressed that such a display must be low cost, light weight, quickly updatable and provide flicker-free high resolution images in order to be commercially viable.

4. Despite of the need expressed in the industry for such a display, currently available liquid crystal display technology has failed to provide a display cell having the required characteristics. Current technologies typically require backlights, which consume power and require heavy batteries with short

life spans between recharge. Current technologies also require an expensive active matrix (transistor at each pixel element) in order to achieve high resolution with quality images at wide view angles. Page size active matrix displays are not commercially feasible for most applications due to their high cost of manufacture, increased size of the back light and added power requirements. Current technology also uses heavy and breakable glass substrates because polarized light is needed for their operation. In short, there has yet to be produced a display that does not require polarizers or backlights, can be made page size at low cost yet can be addressed at commercially acceptable speeds with an inexpensive passive matrix, is truly reflective enabling print-on-paper quality displays and that can provide color without the need for dyes or light absorbing filters, all of which are necessary to meet the needs expressed in the industry. Also there has not been available a reflective display technology that lends itself to light weight, rugged plastic substrates.

5. The invention disclosed and claimed in the aforementioned U.S. Patent Application Serial No. 08/057,662 is the only display technology to date fulfilling all of the industry requirements for a low cost reflective flat panel display suitable for use in the production of electronic books, viewers, electronic newspapers and other reflective displays requiring high quality, high resolution images that can be viewed in sunlight or room light, and can be addressed at commercially acceptable speeds and is light weight and rugged.

6. The advantages of the noted invention include brilliant high contrast reflection without the need for a backlight. The inventive cell enables the preparation of displays that can be viewed in bright sunlight or room light conditions with print-on-paper like quality. The inventive cell can be driven at commercially acceptable speeds without flicker on a passive matrix, thereby significantly reducing costs and simplifying manufacture. No polarizers are necessary, thereby reducing the weight, enabling the use of light weight, rugged plastic substrates, and increasing brightness. Multicolor and full color can be achieved without the need for light absorbing filters or dyes. Importantly, the inventive cells can be prepared with exceptionally high resolution even on full page size displays, while at the same time being driven by an inexpensive passive matrix at commercially viable speeds. As a result, the invention disclosed and

claimed in the noted application fulfills the industry need for a low cost, commercially viable reflective display for applications such as electronic books, page size viewers and the like which, to date, have been unavailable to the industry.

7. I hereby further declare that all statements and representations made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements and representations were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued therefrom.

Dated: 12/21, 1994

  
J. William Doane